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IN MEMORIAM Paul Caspar Freer

Paul C. Freer.

OBITUARY

Paul Caspar Freer

DIRECTOR OF THE BUREAU OF SCIENCE OF THE GOVERNMENT OF THE PHILIPPINE ISLANDS
DEAN OF THE COLLEGE OF MEDICINE AND SURGERY AND PROFESSOR OF
CHEMISTRY OF THE UNIVERSITY OF THE PHILIPPINES AND
FOUNDER AND EDITOR-IN-CHIEF OF THIS JOURNAL

We are deeply grieved to announce the death of Doctor Freer at Baguio, Philippine Islands, on April the seventeenth, in his fifty-first year, from arterio-sclerosis and acute nephritis.

In an effort formally to express our sorrow and to honor his memory a memorial meeting of the members of the Staff of the Bureau of Science, the Council of the University of the Philippines, and the members of the Philippine Islands Medical Association was held on July 1, 1912. The addresses delivered at this memorial meeting are published in this number.

At a meeting of the members of the Staff of the Bureau of Science, held on the eighteenth day of April, the following resolutions were adopted:

Whereas it has pleased Almighty God in His Wise and Inscrutable Providence to remove from our midst Paul Caspar Freer, M. D., Ph. D., Director of the Bureau of Science of the Government of the Philippine Islands, since the time of its organization as the Bureau of Government Laboratories in the year 1901, Dean of the College of Medicine and Surgery, and Professor of Chemistry, University of the Philippines, and Founder and Editor-in-Chief of the "Philippine Journal of Science," who, for many years, has been our Leader, Counselor, and Friend; and

Whereas at best we can do little to indicate at this time our real appreciation of him as a man and as a worker for the general good: Therefore be it

Resolved, That we, the Members of the Staff of the Bureau of Science in Manila, Philippine Islands, do hereby express our deepest sorrow and keen feeling of personal loss in the death of Doctor Freer; and be it further

Resolved, That he holds a place of highest respect, admiration and appreciation both officially and personally in the hearts of all of us, and especially of those who were most intimately associated with him in scientific work; and be it further

Resolved, That it is the sense of the Members of this Institution that the Bureau of Science has suffered a very great loss and that the cause of Science in these Islands has been deprived of one of its most zealous and conscientious advocates; and be it further

Resolved, That we extend our sincere sympathy and condolence to his Widow in her overwhelming grief, to his Sister, Brother and other Relatives; and be it further

Resolved, That copies of these resolutions be engrossed and sent to the bereaved Widow and Brother of Doctor Freer, and that they be filed in the Archives of the Bureau of Science, transmitted to the Bureau of Civil Service, published in the forthcoming Number of each Section of the "Philippine Journal of Science," in the newspapers of Manila, in a paper in the City of Chicago, Doctor Freer's birth-place, and in "Science," the Official Organ of the American Association for the Advancement of Science, of which Doctor Freer was a Fellow.

For the Staff of the Bureau of Science:

[L. S.]

RICHARD P. STRONG,
CHARLES S. BANKS,
E. D. MERRILL,
ALVIN J. COX,
OSCAR TEAGUE,
A. E. SOUTHARD,
Committee.

At Manila, Philippine Islands, this eighteenth day of April, in the year of our Lord one thousand nine hundred and twelve.

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In Memoriam

PAUL CASPAR FREER

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THE LIFE AND CAREER OF DOCTOR FREER.

By MARTIN EGAN,
Editor of the Manila Times.

When Doctor Musgrave asked me to come to this memorial gathering and sketch in brief the life and career of Paul Freer, my first thought was to ask him to excuse me from a task so painful. I knew that if I did so I must bare my heart in sorrow for my friend who has gone and then I realized that we would all be here to-day with our hearts bared in sorrow, that no man need hide his heart in such a communion of friendship in grief, and so I come to take my place among those chosen to pay tribute to the memory of the good man whom we have lost from our councils, the friend passed from the narrowing circle. Paul Freer descended of a line worthy of him, its product, he worthy of his lineage. His father was a man of scientific attainments, who gave his life in that noblest aim of science, the saving of human life; his mother, a scholar, a linguist, of high culture, of rare mind, and compelling maternal love for the well-being of her children. The elder Freer, born in New York of an old family of Dutch extraction, settled in Chicago, then a scattering town of 7,000, and entered upon the practice of medicine. He quickly advanced to leadership in the growing city, and became president of Rush Medical College which he had helped to found. Overwork in a severe epidemic of typhoid fever that swept the city led to his breakdown and death, and the care and education of his children, including him whom we honor and mourn to-day, passed to the widow and mother. Mrs. Freer, his mother, was born in Württemberg and as a girl went to New Orleans to make her home with her uncle. Herself an advanced student, she devoted herself assiduously to the education of her children. It is related of the family that it was a rule to conduct table

conversation in Latin, French, or German and that good books were the first of its household gods. It was in this wholesome and stimulating atmosphere that Paul Freer received the first inspiration for study and investigation that was the compelling influence of his whole career. He was taken to Germany as a child for his rudimentary training, and he was destined to go there again to complete his education and receive from the Germanic school his chief methods and ideals in science, in education, and in general thought. Returning to Chicago, he entered the high school and when his class was graduated he stood at its head, the first student of the school. He had already determined to follow in the footsteps of his father, and from high school he entered Rush Medical College and began the study of medicine and surgery. It was at Rush that chemistry with its wonders and unsolved mysteries made its great appeal to his opening mind. He learned its rudiments at the feet of Professor Haines, well remembered as a sound scholar and instructor, and there resolved to specialize in it. He continued his medical work and graduated with the class of 1882, still a year under the age of 21. Germany was then leading the world in science and it appealed to the young student with all the forces of enthusiasm and instinct for he had the blood of the Fatherland in his veins. He determined to go to Munich and join the classes under the great von Baeyer, then the leading chemist of Europe. The choice proved a happy one for there grew a great and lasting friendship between the master and student that was deep in its influence upon the career and work of the younger man. I have recently seen a letter from Doctor Schieffelin, himself an eminent American physician, who went to Munich the year Paul Freer graduated and took his high honors, and in it he wrote:

> When I went to Munich in 1887 to study chemistry, I found that Professor von Baeyer, probably the most eminent chemist living, and the laboratory chiefs were all full of the praises of Paul Freer who had just taken the degree of doctor of philosophy, *summa cum laude*, which I believe was the first time a foreigner had achieved this distinction. And for twenty-five years I have watched with interest and pride his service to science and the government. He was an American gentleman of the highest type and of a charming personality.

Our departed friend has talked to me many times of those golden days at Munich, and I have always believed that they gave him the perfection of his ideals and logic and the soundness of his methods and thought and work. He left Munich fully equipped for work, and for a brief period labored and studied in England, first in the private laboratory of Sir William Perkin, where he devoted himself to analin dyes, and later at Owens College, Manchester, where he was an assistant instructor. But his desire was to return home, and when Tuft's College offered him a place he gladly accepted. But he was not to remain there. The faculty of the University of Michigan had heard of his ability and rising fame and offered him a larger field and scope of work. He went to Ann Arbor as lecturer in 1889 and a year later was honored with the professorship of inorganic chemistry, with a chair in the Medical School as well as in the School of Arts. It has been testified by many that Paul Freer brought to Michigan a wonderful stimulus for original work. He had the high ideals of the German university, less known and understood then in our American universities, he had the enthusiasm of youth, and he had ability as his commanding talent. He was impatient of mediocrity, and gave the best of himself to the earnest worker, the advancing student who came to him for instruction and guidance. His seriousness amounted at times to austerity, but it produced results and was in keeping with the high standard of scholarship of the members of the faculties at Michigan. In 1895 the University of Chicago sought his services, offering him a professorship of chemistry, but he declined the flattering offer, electing to stay where he was accomplishing so much good work. There he remained until 1901, when the United States Government gave him a chance for service in this field, so rich in opportunity for practical scientific work. He accepted the task, and here are written the last and greatest chapters of his life. You know them perhaps better than I. I was his personal friend and could share but little in the multiplicity of his official and professional activities, many of you were of them with him. I do know that we meet to-day in one institution and are surrounded by

others that are to a large extent monuments to his ability and service. In whole or in part they were born in his mind, shaped by his thought and plans, projected upon his knowledge, constructed with his advice, and administered by his direction and counsel. You who have shared with him in this work may well be proud for here humanity suffering is hourly served.

I have known no man better equipped for his place and part in life than Paul Freer. He was born for his profession and crowned natural equipment with the best education and training that the world can give. He was an advanced investigator. He sought the truth and he entered the house of truth with open mind, without prejudice or fear. His industry bore constant fruit. He had the rare quality of detachment. He could drop the cares and burdens of administration for the laboratory or the literature of science, in both of which he gained distinction. His talents were of wide range, his industry boundless, his service faithful. He was a true friend.

To his widow, his kinsmen, his friends there is left a rare consolation. He did a man's work, and that is the best record that any of us may hope to carry to the Master of sciences.

PAUL CASPAR FREER, HIS INFLUENCE UPON OTHER MEN.

By CHARLES H. BRENT,
Bishop of the Philippine Islands.

There are two distinct, though not mutually exclusive, types of influence exerted by men upon their fellows: that which is let loose by conscious volition, and that which is automatically given off by inherent virility, just as perfume is exhaled by the flower. The former focuses certain powers to achieve a given end and then relaxes, like the fitful spouting of a geyser; the latter is a milder though more consistent flow, like the bubbling of a perennial spring: the former aims at, and succeeds in making, an impression; the latter naturally and simply creates an atmosphere.

Both types of influence are necessary and valuable, but of the two the most potent and constant is that unconscious pressure of the whole personality which was characteristic of Paul Caspar Freer. If, on occasions, he could effectively impress a companion in accord with definite determination, it was because he possessed the consistent background of cultured manhood.

It is chiefly men with an imperfect education who find it necessary to be vociferous and theatrical in their efforts to influence others. They fret and scheme, and are never wholly themselves. But the man who is highly educated, that is to say, who, like Doctor Freer, has established many points of contact with nature, animate and inanimate, enjoys a repose which in itself is power. His composure was, doubtless, sometimes disturbed, else he would have been less than a man, but ordinarily he left you with the feeling that life was too good to allow of haste, too safe to justify panic, too sacred to tolerate scheming.

His versatility was such as to make a pleasant companion, full of surprises. Now it was some detail of scientific knowledge which slipped out of his well-stored mind, not as instruction pedantically imparted, but as the unpremeditated expression of his thought; now a reminiscence of the Tyrol, or an anecdote of Chopin, called up by some strain of classical music to which he was devoted.

Almost the last glimpse I had of him was on the golf course. His lank form was striding over the links with that abandon and freedom which denote complete absorption in a pursuit. It was indicative of his entire life. He traveled hopefully, joyously, whether in the quiet retreat of the laboratory, or through the mountainous home of Igorot and Calinga, or in the valley of the shadow of death.

Strong personalities never seem more alive than in that gloaming which succeeds life's sunset. They refuse to die. Their littlenesses drop out of sight, and the full force of their true character influences us. That Paul Caspar Freer lives yonder with God in the conscious enjoyment of manhood not quenched but vivified through the discipline of death, who dare doubt? But he also lives as an influence rather than a memory among us men whose hands are still busied for a short while with the affairs of here and now. Personality can not die even if it would.

DOCTOR FREER AND HIS GENERAL INFLUENCE UPON SCIENTIFIC WORK IN THE PHILIPPINE ISLANDS.

By RICHARD P. STRONG,
Chief of the Biological Laboratory, Bureau of Science.

We are here to honor the memory of a faithful and able worker, an earnest teacher, a loyal son of this Government, and a good and kindly friend. Paul C. Freer has left behind him a record of work well performed and, to those of us who knew him, the memory of a well-spent life. Although the real achievement of every great man of science lies particularly in his original contributions to science, and Doctor Freer's publications will be told of by others who are here to-day, for those who have formed their image of him largely through his writings I shall try to relate a few of the details of his scientific career and of how he moved among his fellow workers in his daily life; for, since he came to these Islands, I have, perhaps, been more closely associated with him in his work than any one else.

To him belongs the great merit of having been the pioneer in the general scientific work of the Government of these Islands. For more than ten years he has encouraged in every way at his command the cultivation of these scientific branches, and, since the establishment of the Bureau of Science and of the College of Medicine and Surgery, has unselfishly devoted his time to the best interests of these institutions. Indeed, there has been practically no scientific movement of value in these Islands since his arrival in which he has not been interested or has not taken an active part. Though, when he first began his work among us, chemistry was the branch of knowledge to which his mind most distinctly inclined and the one in which he took

the greatest interest, nevertheless, on assuming the directorship of the Bureau of Science, he threw himself into the work of its organization and development with an energy, industry, and ability that could not fail to bring success to his efforts. In this Bureau, with its various divisions, biology (including medicine, general biology, botany, and entomology), chemistry, mining, ethnology, ornithology, and fisheries, there was not one division in the work and development of which he did not take a deep interest, and, more than this, he knew what work was being carried on in each division and much of its value. Moreover, he planned and followed with great interest and attention, born of a clear insight and knowledge of chemical problems, practically all of the investigations carried on in the chemical laboratory. In this remarkable breadth of interest and in the comprehensiveness of his knowledge he will always hold a unique position in the history of scientific work. It is not too much to say that no bureau chief in these Islands ever had the welfare of his bureau more at heart than Paul C. Freer and none have fought harder and with a greater persistence than he did to secure the annual appropriation from the Government, necessary to carry on the scientific work here. With all this, and apart from his natural ability, he brought to the Bureau and maintained there an exalted professional standard. Nevertheless, his directorship in this institution has been arduous and complex and has required the exercise of the very highest qualities of the mind.

One of his early aims was the establishment of a scientific journal to be published by the Bureau of Science, and this was accomplished as soon as the necessary legislation was enacted by the Government. In this journal (The Philippine Journal of Science), of which he was the editor, he took a remarkable pride and interest. He was an editor in every sense of the word, and but few realize the number of hours he spent at this work, preparing manuscript for the printer. Often have I found him at home on his holidays with a large pile of articles by his side, and sometimes he would spend many hours of the day correcting and rewriting poorly prepared manuscript with a

patience and good nature that was truly remarkable. However, the ripeness of his critical judgment and the facility of his literary taste made most of this work easy for him, and not infrequently he earned the gratitude of some young author by having caught the spirit of his clumsily and illy-expressed ideas and transcribed them for him into terse and lucid language. His work of this nature was ever done with the conscientious desire to benefit the writer to the greatest degree. By the majority of the scientific staff of his Bureau he was particularly admired not only for the things which he had done in science, and not only for his intellect and for the wide grasp of his mind, but also for his fairness of judgment in all scientific matters and for his love and appreciation of scientific truth. In all the little disputes in his laboratory, he evidently endeavored never to let himself be led away by his personal feelings, but to give his decision in an impartial manner. His attitude finally inspired, among many of his colleagues, a confidence that he would judge their differences calmly and impartially, and there existed an intellectual bond between him and many of his laboratory workers. In the latter years of his life, his personal judgment of men and things was extensively sought after and his advice cheerfully and unselfishly given. I never knew him so busy with his own work that he would not willingly be interrupted by a colleague who wished to discuss with him some scientific problem or who sought his aid or advice. At such times it ever seemed to be his earnest desire to give the most efficient assistance to those who so came to him.

If we attempt to analyze his success, if we ask ourselves what were the qualities of his mind and character (for the two can not be separated in an investigator) by which he stood above many of his colleagues, we shall find as conspicuous traits, his comprehensive knowledge of scientific problems in general, his diligence and accuracy in the details of daily life, and his wholly upright and open character in all scientific matters. These traits were certainly powerful factors in contributing to his successful career.

However, my effort to-day is not only to pay a deserved

tribute to the memory of one in whom energy and industry were prominent traits of character and who was always so loyal a friend to his colleagues in their scientific work, but also to point out the importance of his labors in an educational way and to emphasize the importance of his establishment of a scientific institution in which the criteria of the true spirit of inquiry were always insisted upon.

Finally, his life must ever serve as a beacon to those of us who strive to emulate faithful devotion to duty.

DOCTOR FREER AND THE BUREAU OF SCIENCE.

By DEAN C. WORCESTER,
Secretary of the Interior of the Government of the Philippine Islands.

At the time civil government was established in the Philippine Islands, there fell to my lot the drafting of legislation which had for its object the establishment of scientific work upon a firm and lasting foundation.

As a member of the zoölogical staff of the University of Michigan, I had had abundant opportunity to learn by practical observation how such work should *not* be carried on. This institution supported a zoölogical department and a medical college. In the zoölogical department we taught among other things the zoölogical half of a beginner's course in general biology, the anatomy of the cat, comparative anatomy, the embryology of the chick, and comparative embryology. In connection with these courses we operated the necessary laboratories, and for purposes of reference we had a very incomplete library.

In the medical college there were a histological laboratory, a pathological laboratory, a so-called hygienic laboratory which was in reality a bacteriological laboratory, and an anatomical laboratory.

The pathologist maintained that it was necessary for him to teach his students normal histology because the histologist did not know his business and students could not appreciate pathological conditions of tissues until thoroughly familiar with such tissues in their normal state. Similarly the histologist felt called upon to teach his students pathology because of the supposed incompetence of the pathologist. Each had trouble with bacteriologists over questions as to where histology and pathology left off and bacteriology began. At the outset only

human anatomy was taught in the anatomical laboratory, but later the anatomist in charge felt called upon to inaugurate other work in mammalian anatomy and in comparative anatomy as well. The histologist ultimately branched off into the embryology of the chick and began to talk about giving courses in comparative embryology.

Here then, within the limits of a single institution, I had observed no less than five different laboratories, each with its staff of instructors, its library, its expensive instruments, apparatus, and reagents; each more or less undermanned and inadequately equipped; each duplicating or striving to duplicate work carried on in one or more of the others. The result was needless expense, lack of readily obtainable efficiency, and constant bickering.

Furthermore, there had come to my attention rather startling instances of the duplication of scientific work in the departments at Washington.

While the complete lack of adequate facilities for carrying on imperatively necessary biological and chemical work which confronted us when civil government was organized in the Philippine Islands was appalling, I was nevertheless inclined to derive comfort from the old saying "Blessed be nothing," for we had at least the opportunity to *start* right, unhampered by costly but antiquated equipment, by worthy but incompetent investigators, or by quarrels as to who should do what needed to be done.

The materials with which to concoct a muddle worse than any of those with which I was already familiar lay ready to hand. At one time or another the Bureau of Customs has wished to establish a chemical laboratory and a so-called "microscopic laboratory." The Bureau of Forestry has thought that it needed laboratories for chemical, botanical, and entomological work. The Bureau of Agriculture has urged precisely similar needs and has desired to take up bacteriological and pathological work as well. The original Board of Health and its successor, the Bureau of Health, have been disposed to demand laboratories in which to conduct both routine work and original investiga-

tions in chemistry and biology. And so on to the end of the chapter.

I early decided to make a determined effort to centralize the laboratory work of the Insular Government under the control of one man, to the end that unnecessary and wasteful duplication of staff and equipment might be avoided and that maximum efficiency might be attained at minimum cost. With these ends in view, I drafted, and on July 1, 1901, secured the passage of "An Act providing for the establishment of Government Laboratories for the Philippine Islands." The passage of this Act laid a reasonably broad foundation, but did nothing more. It was necessary to plan and construct a modern laboratory building which should afford adequate facilities to meet the then existing, and probably future, needs of the Government; to list, buy, house, and properly catalogue a fairly complete scientific library; to purchase and install costly and complicated scientific apparatus; to provide seasonably a formidable array of expendable reagents and supplies; and most important of all, to secure the services of a large staff of well-trained scientists, capable not only of performing necessary routine examinations with unfailing accuracy, but also of grappling with some of the many scientific problems whose early solution was then imperatively needed. To the end that the best possible results should be obtained, it was necessary that the work of the members of the staff should be coördinated and directed by a master mind.

It was obvious that the man who could undertake such a task with hope of success must combine an unusually broad knowledge of the different branches of laboratory work with a wide acquaintance among scientific investigators, familiarity with cost and sources of supply of books, apparatus, and reagents, sound business judgment, good administrative ability, and hard common sense.

I chose for this important and difficult position Dr. Paul Caspar Freer, then professor of inorganic chemistry in the University of Michigan, and never was man more fortunate in his choice.

Doctor Freer's preliminary scientific training, begun in the United States and completed in Europe, had been exceptionally thorough and broad. He had displayed very distinguished ability as an original investigator and had always been most successful in directing the investigations of others. He had placed his own laboratory at the University of Michigan on a sound basis and had made numerous helpful suggestions calculated to promote efficiency and economy in the work of others of the university laboratories. Incidentally he was the youngest man ever appointed to a full professorship in the University of Michigan. I, myself, had been a student there at the time of his appointment.

Later, when both of us were members of the University faculty, we had repeatedly discussed the possible reorganization and centralization of the laboratory work of the university and had agreed that greatly increased economy and efficiency might readily be secured were some one competent person put in charge with power to act.

When the opportunity came to make a clean start in the Philippines, I felt that Doctor Freer was just the man whom I needed, and having first secured due authority, I offered to him the newly created position of Superintendent of Government Laboratories, at the same time outlining my plans for the future. The opportunity for creative work appealed to Doctor Freer, and to my very great satisfaction he accepted the position. We have profited by his mature knowledge, amazing in its breadth and accuracy.

At the outset he had no thought of permanently abandoning his university career, but requested and obtained a year's leave of absence in order to help us get started. At the end of that year his work was only begun. Mr. Taft, then Civil Governor, secured an extension of his leave for another year, and at the end of this second period successfully urged upon the university regents the almost unprecedented act of granting to a member of the faculty a third consecutive year's leave.

Meanwhile things had been happening here. At the outset Doctor Freer had found himself in the embarrassing situation of

being compelled to plan the future buildings, equipment, and personnel of the Bureau of Government Laboratories, and at the same time immediately to provide for the carrying on of urgently necessary routine examinations and original researches.

The new bureau had had small beginnings in a little building, which might without serious inaccuracy be called a shack, situated to the rear of the private residence in which the Civil Hospital had been established. In the cramped, inadequate, and unbearably hot quarters which it afforded, there were inaugurated and carried out scientific investigations of far-reaching practical importance in connection with amœbic dysentery, Asiatic cholera, and bubonic plague. More than one comparatively unknown worker here laid the foundation of an international reputation.

The preparation of plans and estimates for the permanent laboratory building, the completion of lists of necessary scientific books, apparatus, and supplies, and the figuring out of an adequate laboratory staff occupied much of Doctor Freer's time during a period of two years. I speak whereof I know when I say that plans and estimates so complete and accurate as those which he ultimately furnished were never before nor since presented to the legislative body of these Islands.

The aggregate sum of money involved was so large as to make its appropriation at one time inexpedient if not impracticable. Furthermore, it would have been worse than useless to have books and apparatus arriving without a proper place in which to house them, or to employ scientific workers prior to the provision of adequate laboratory accommodations for them. Doctor Freer was, therefore, compelled to give most careful consideration to a scheme for spreading the necessary expenditures over a period of years.

His elaborate plans and estimates proved adequate and final. They were never departed from in any essential particular, so far at least as concerns the work then under contemplation. The only changes which have proved necessary were incident to providing for a large amount of additional scientific work when the scope of the original Bureau of Government Laboratories

was added to and its designation was changed to "The Bureau of Science."

After all plans and estimates had been perfected, it was necessary to persuade a legislative body, including in its membership only one lone scientist, to provide the necessary funds. Doctor Freer was naturally required to state why he wanted what he wanted, with the result that he got it.

The work speedily outgrew the little one-story building in which it started. The biological laboratory was transferred to a much larger building on a distant street, and administration was thus complicated.

There was endless delay in the completion of the new building. Grossly exaggerated rumors as to its cost led to the charge that its erection had involved needless and wasteful expenditure. Salaries were necessarily small.

The underpaid members of the Bureau staff were publicly attacked, collectively and in some cases individually, as impracticable and visionary beings, who were devoting their energies to wasting the funds of a poverty-striken government in useless abstract investigations.

One member of the Philippine Commission who had conceived the idea that scientific books were intended only for filing in imposing ranks on the wall, as is done with formidable looking tomes by lawyers of a certain class, for years bitterly assailed every appropriation requested for the Bureau. Through good report and ill Doctor Freer held on his course with clear foresight and unwavering tenacity of purpose, convinced that he should win in the end because he was right. He lived to see this belief abundantly justified!

As the end of his third year of leave approached, he received an ultimatum from the Michigan University authorities to the effect that he must again take up his university work or sever his connection with that institution. An immediate reply by cable was necessary. I asked him to state to me the conditions under which he would be willing to remain in the Insular service, and he did so. No quorum of the Commission was present on that day and, as immediate action was imperative, I stated the

facts to four of my colleagues, with a view to obtaining their prior approval. Doctor Freer's proposition was perfectly clear to me and I thought that I made it clear to them. They agreed to accept his offer as they understood it. With a majority of the Commission thus pledged to its acceptance, I informed him that it would *be* accepted, and he then immediately severed his connection with the University of Michigan by cable. A few days later when I requested definite official action by the Commission, I found to my consternation that two of the members with whom I had consulted had failed clearly to understand the terms on which Doctor Freer was willing to remain. When the matter came to a vote my action was not confirmed. I was, therefore, compelled to inform him that he would not be given the salary for which he had stipulated and that the fault of this unfortunate blunder lay entirely with me for the reason that I had failed to submit his proposition to my colleagues in writing and to secure on the face of the document their written approval.

He immediately cabled to ascertain whether he could withdraw his resignation from the faculty of the University of Michigan, but before his message was received his place had been filled.

It is a significant commentary on his character that, although he felt, rightly, that a grave injustice had been done him, he remained loyal both to the man who was primarily responsible for it and to the Government which he served.

With the lapse of time the work conducted under his wise guidance rapidly and steadily developed. The Bureau of Government Laboratories absorbed the Bureau of Mines, took up botany, ornithology, entomology, fisheries, cement testing, and other new lines of investigation, and thus became the Bureau of Science. It furnished its own light, power, steam, and gas so economically that it was required to perform these functions for the College of Medicine and Surgery and for the Philippine General Hospital. These changes meant larger working quarters and a material addition to the power plant, which were provided under Doctor Freer's always competent and efficient direction.

As the volume of research work grew and the necessity for the prompt publication of its results became urgent, the Bureau entered upon the risky venture of beginning the publication of a scientific journal, which must depend for its subject matter upon the results of the work of a limited number of investigators, much of whose time was necessarily occupied by routine examinations. To-day the Philippine Journal of Science is one of the world's standard scientific publications. In it have been published the results of scientific investigations of far-reaching importance. In my opinion, it has done more than any other one thing to spread throughout the world knowledge of work being done in the Philippines for the uplifting of a people and to spread that knowledge among men whose opinion really counts.

The business affairs of the Bureau of Science have been exceptionally involved. It has often been necessary to order apparatus a year or more in advance in order to be sure of having it ready when required. Important book orders have sometimes remained unfilled for years and have had to be repeatedly canceled and re-placed. The Bureau has been dependent in part upon its receipts for money with which to operate and the annual total of such receipts could not be accurately foreseen. It was known to Doctor Freer that deficits would not be approved by the Secretary of the Interior. There have been none.

Scientists of established reputation have strenuously objected to taking civil service examinations and have had to be reasoned with. After arrival at Manila some of them have even more strenuously objected to accounting for their time and have in many ways displayed a desire to be considered in a class by themselves. It has been necessary for Doctor Freer to teach them that they were very much like other people, and would be so considered.

New men have not infrequently desired to reserve for themselves certain fields of investigation which they were not ready immediately to enter and have needed to be inspired with a broader and more truly scientific spirit. Doctor Freer has been peculiarly fortunate in dealing with this too common foible of

research men, and the unseemly brawls which so often occur over questions as to who shall do what, and as to priority of results, have been conspicuously absent.

For a long time the Bureau served as a training school for other and wealthier institutions which could afford to buy our employees away from us and did not hesitate to do so. The fight for more adequate salaries was a long and tedious one, but it has achieved important results.

In another particular he has deserved well of the Government. My original plan contemplated a close and helpful relationship between the Bureau of Government Laboratories, a medical college, and a great general hospital. I was told that my scheme was chimerical because three such institutions would never work together harmoniously. This prophecy has proved false. Doctor Freer thoroughly understood the meaning of the word *coöperation,* and on more than one occasion taught it to others, both by precept and example. Under his direction the Bureau of Government Laboratories and its successor, the Bureau of Science, have maintained a helpful relationship with the Bureau of Health and the University of the Philippines.

Doctor Freer may most truly be said to have lived for his work. While he sometimes shortened his afternoon hours sufficiently to make possible the taking of sorely needed exercise, he habitually labored far into the night and on holidays as well. During his last year he had repeated and prolonged attacks of acute suffering. In each such instance he resumed his work before he could rise from his bed. In the course of the last day of his life his thoughts turned again and again to the work and the needs of the Bureau of Science. His relationship to that Bureau may be very briefly summarized. *I* dreamed a dream. *He* made that dream come true. It is not too much to say that he created the Bureau. It will be a lasting monument to his unquestioned scientific and business ability, his clear foresight, his sane judgment, and his unwavering perseverance.

There have not been lacking prophets of evil who have felt that the success of the work of the Bureau of Science was so

intimately associated with the peculiar abilities of its director that the Bureau would go to pieces now that his guiding hand has been palsied by death.

It is not to be expected that anyone else could, at the outset, run so complicated a machine with the capable and peculiarly sympathetic touch of the man who built it, but ability to produce a machine which *can* be operated successfully by others determines the value of the builder's work. As the years go by, it will be realized that the constructive work of Doctor Freer for the Bureau of Science has successfully met this, the final test.

PROFESSOR FREER AND THE UNIVERSITY OF THE PHILIPPINES.

By WILLIAM EVERETT MUSGRAVE,
Chief of Clinics, Philippine General Hospital.

History records no more complete and unselfish devotion to science than is exemplified in the life of Paul Freer.

He was essentially an investigator and teacher, combining these virtues in such a manner as to make every man who became closely associated with him his pupil. In personality, in the character of his researches, in versatility of mind, in the utilitarian aim of all his work, in his generous attitude of help to all who applied for assistance and advice, and in many other points Professor Freer very closely resembled the illustrious Pasteur.

Pasteur was the father of bacteriology and lived to guide this great science from uncertainty to the road to success. Paul Freer was the father of modern science in the Philippine Islands and he lived to see and guide the developments of his creation to success.

Starting with nothing but a fertile soil and a legislature whose friendly interest was secured and maintained by the untiring activities of the Honorable Dean C. Worcester, he built up a great research institution that to-day is classed with the best in other countries.

During the early years of our residence in this country, he watched the development of elementary education with much interest, and his counsel during these years was a potent influence upon the policy of the Government in educational development.

Educational progress was so satisfactory that in 1905, at its annual meeting, the Philippine Islands Medical Association rec-

ommended the establishment of a Medical School. Doctor Freer was chairman of the committee which, with the active co-operation of Mr. Worcester, succeeded in securing satisfactory legislation. "The Philippine Medical School" opened its courses of instruction in 1907, and was merged with the University of the Philippines as the College of Medicine and Surgery in 1909. Doctor Freer was dean and, also, professor of chemistry from the organization of the school until his death, which occurred just five years after the opening of the school and shortly after graduation of the first class of physicians who had taken their entire course of instruction in this institution.

He always stood for high standards in educational work, and it was due largely to his efforts that the College of Medicine and Surgery was able to establish and maintain rigid entrance requirements, a five years' course of instruction, and to secure a faculty of research workers who are paid for teaching. This was no easy task. The public demand for more physicians, the small number of thoroughly prepared students, the limited resources of the Government, and the political exigencies were such that the pressure brought to bear for lower requirements for admission with larger classes, shorter courses of instruction, and less expensive teachers and methods was very strong. Doctor Freer very correctly considered that the stand taken by the Philippine Medical School would determine, for a long time to come, the policy of higher educational methods, and in winning this fight for high standards he not only gained world-wide recognition for our school from the first, but a precedent was established that made a similar policy practicable for other colleges and prepared the way for a University before one was created.

During the first years of our work, while searching the world for suitable teachers for the Medical School, Doctor Freer crippled the efficiency of his own Bureau by furnishing a large proportion of the faculty from the members of the staff of the Bureau of Science. Not only this, but he gave freely of his own time and even diverted funds, as far as practicable within the law, in order to insure the success of the school.

The methods of successful men are always interesting and instructive. Professor Freer's methods were very simple. In dealing with his superiors he usually made a direct request and reënforced this request by a presentation of all the facts bearing upon the subject. If the first effort failed, he would repeat the request until he secured what was wanted or was ordered to desist. In dealing with his colleagues and assistants, his watchword was *efficiency* and all men were judged upon this basis, a very satisfactory method for a man of his broad learning and experience, but a hazardous one for a less experienced leader.

Something of Doctor Freer's conception of the function of a medical school is shown in his Commencement Address to the graduating class in 1910 in which he said:

> The exact training which the graduate of a modern medical school obtains from his work in the various laboratories; the development of his powers of observation by a study of physics, chemistry, bacteriology, pathology; by his contact with the methods of diagnosis and clinical reasoning in the hospital and by the broad phases of hospital discipline which surround him during the final years of his course of study, will have been without meaning if they have not shown him one fundamental fact, that all of this hard work will have been valueless, if he has not had introduced within his being the divine spark of independent thought * * *. If he has not this ambition, his future will be first one of stagnation, then of retrogression. It has been one of the chief missions of the Faculty to cultivate this spirit among the students, and the members of the latter body themselves must be constantly extending their view-points and developing the various special branches to which they are devoting their attention. What is true of the individual members holds good of any institution of learning, a condition of dependence on what is already known and a tendency to look backward into the past is in reality retrogression; and intellectually such an institution must die, no matter how magnificent its buildings, how extensive its equipment, or how generous its means. The teaching force must itself not only be capable of advancing new thought and of developing new methods, but it must utilize these capabilities to the best advantage, continually and restlessly pressing forward to higher ground. Otherwise, the teacher is not capable of inspiring his pupils, he becomes a mere repeater or reciter of text-books, a monitor or supervisor of method which of itself is cast into fixed molds and is already passing toward its end.

Continuing in this same address, our dearly beloved friend and teacher has left us the following advice for the future policy and guidance of the school:

> We must therefore, in the future as in the past, strive to obtain and retain men in the school of the best capability for advancing their own technical specialties. Mere teaching will not do, it lacks that peculiar force which renders the pupils in after life capable of independent development. Mere study on the part of the expectant graduate will also not do. He must continue his scientific growth by observation, thought, study and reasoning from the facts as he finds them to those lying in the higher realms of advance beyond. Faculty and students form the institution as a whole, and it is for them to see that, through the many years of its existence, it continues to play its part in the great advance of human thought as a vigorous entity in the community of schools of learning.

In this last quotation we are given a duty that is made sacred by the martyrdom of him who gave it. The duty is a hard one; no one realized more fully than did Doctor Freer that our greatest difficulty would be to inculcate the spirit of independent thought in our students. Five years of experience has shown that there are local causes, intrinsic and acquired, that make this the greatest problem of our institutions of advanced learning, and the ultimate success of our work depends upon our being able to surmount these difficulties which only may be done by constant effort and the revolutionizing of the customs and practices of centuries.

This is the one phase of our educational development that had not been satisfactory to Doctor Freer, and I bespeak the coöperation of the members of the Faculty to make the appeal contained in his last public utterance to us our watchword for success; and may our efforts not cease until the Paul Caspar Freer Professorship of Chemistry in the University of the Philippines is freely recognized as one of the positions of honor in the scientific world.

DOCTOR FREER AS AN ORGANIZER AND AN ADMINISTRATOR.

By MURRAY BARTLETT,
President of the University of the Philippines.

It is a rare thing when the creative and executive faculties are united in one mind. Rarer even is the combination of scientific genius and business ability.

To see deeply into the laws underlying the mystery of nature, to follow the trace of unknown promise to a successful conclusion, then to apply the practical methods of efficient life to the results of scientific research is seldom achieved by one mind and will. It is this combination of human powers that has made possible the fame of an Edison, a Bell, a Westinghouse. In most cases, men, such as these, use their ability to capitalize for material value the fruits of their scientific investigation.

Doctor Freer was one of these rare men. Undoubtedly he could have devoted his extraordinary ability to amassing a large fortune. Indeed, he had more than one opportunity so to do. He might have erected upon the foundation of his genius for seeing nature's hidden powers a great business organization in his own land for his own enrichment. Instead, he built up about his research and the research of others a great institution for the practical benefit of humanity in a strange and far-away land. The Bureau of Science is, perhaps, not so much a monument to Freer, the Scientist, as to Freer, the Organizer. Truly could one of his friends say, "The Bureau of Science is Freer."

This is why there has been universal testimony to-day that his place can not be filled. If such a statement can be true of any man, it is certainly true of Doctor Freer, for where can be found one, not only preëminent in his own line of study,

but familiar with the details of every other phase of scientific investigation; possessing the practical ability of a captain of industry and inspired by a spirit of service for country and for humanity? To say, however, that Doctor Freer's place can not be filled is not to declare that the work of the Bureau of Science can not go on. His task was so well done, so completely organized that, with careful guidance, its many activities may continue unimpaired through the years.

Doctor Freer had all the qualities of a great organizer; untiring industry which keeps no office hours, knowledge of affairs in the broad sense which kept him in touch with the practical needs of the world of trade and commerce, and ability in choosing his assistants. Of these qualities, it is needless to speak. The organization he left behind speaks for him. In treating the subject of Doctor Freer as an organizer and an administrator, I wish to mention the characteristics which were peculiarly his own.

First, he was capable of rare unselfishness where an ideal was to be gained. All the way through, he sacrificed his own time and desire for investigation in order to guide the investigation of others for the good of his Bureau. It was to him a real deprivation to give up his own personal research in a field in which he had few peers and no superiors, yet there was no hesitation on his part in giving freely the results and the credit of his experience to men who were just beginning their scientific investigation.

Nowhere does this unselfishness appear more clearly than in Doctor Freer's relations with the College of which he was the executive head. The Philippine Medical School was very largely the creation of Paul Freer. Its thoroughness of instruction and its high as well as practical standards were made possible by his thorough acquaintance with medical instruction and his extraordinary knowledge of university affairs. He was thoroughly imbued with the idea of founding here, in these Islands, a great Medical College; to provide for the Filipino people a succession of competent physicians and surgeons who should protect and safeguard the health of their race. He had the

right to take pride in the success of this institution and to look upon it as his own. When, however, by operation of law the Philippine Medical School ceased to be an independent institution and became a constituent part of the University of the Philippines, he gave the same care, enthusiasm, and loyalty to the College of Medicine and Surgery, although he occupied, what might appear to be, a subordinate position. I sometimes think that I saw the biggest side of Paul Freer—the older man and the younger man, the man of long and rich experience and the man with little. If in future years any credit is given to the work of laying the foundation of this University in its early days, the larger part should be his.

This spirit of unselfishness enabled him to administer his trust, not for the benefit of his own Bureau, but for the larger cause of the Government as a whole, and for its work in these Islands. His outlook was broad and his vision clear. With him the Bureau of Science was simply one means of rendering a service to the Philippine people. His real aim was to make that service as perfect as possible. A favorite phrase with him was "we must play the game." To him, the game was not an opportunity for individual play, but for team work.

In our own relations, the unusual facilities of his Bureau were freely offered to the University, and I believe that in his dealings with other departments of the Government, his attitude was marked by the spirit of true coöperation. Thus he has left behind him a great lesson in administration to those of us who are administrators in this Government. His example entreats us to work not for the conspicuous success of our own Bureaus but for rendering a complete and perfect service by the whole Government.

The University of the Philippines will always revere the memory of Paul Caspar Freer; great as a scientist—greater, perhaps, as an administrator—but greatest of all as a man.

DOCTOR FREER AS A FRIEND OF THE FILIPINOS.

By FERNANDO CALDERON,
Professor of Obstetrics, University of the Philippines.

There are three classes of Americans according to their feelings toward the Filipinos with whom they are in daily contact. First, there are those who maintain an attitude of *absolute indifference* with respect to the future of the Filipino people, when both races should thoroughly know and gladly help each other. These Americans, after spending some time in the Islands, return to the United States without having in any manner coöperated in the improvement of their brothers, the inhabitants of this beautiful Archipelago. Then, here are those who are absorbed by a feeling of *utter selfishness*, and whose sole desire is that this country be converted into a fit place for the satisfaction of their personal ambitions, thus forgetting entirely the economic welfare of the Filipino people. Lastly, there are those noble Americans who have come to the Philippines imbued with a kindly spirit toward the Filipino, whom they treat as brother and friend.

The object of these Americans, who are, after all, the real and proper representatives of the great American nation in the Far East, in coming to these shores, is neither to further their private interest nor to satisfy their greed for wealth, but to fulfil their sacred mission of service and usefulness and to set an example of righteousness to their fellow-countrymen here, so that we may justly call them the standard-bearers of a civilization which is based on the ethical and immutable principles of democracy and on that great ideal of history: the universal brotherhood of man. These are the Americans whose beneficent influence will infuse new ideas and new energies into our insti-

tutions and inculcate into the minds of the rising generation that wholesome spirit of democracy which will make the Philippines the most prosperous and progressive country which the world ever beheld in these far-away regions of the extreme Orient. To this group of worthy and self-denying citizens of America the late Dr. Paul C. Freer belongs, whose memory will ever be cherished by those Filipinos who have had opportunity to realize his untiring efforts for the advancement of science in the Philippine Islands.

I need not remind you, of course, to prove my assertion, that Doctor Freer was the one who created and established the Bureau of Science on a scientific basis, helped a great deal in the foundation of the Philippine Medical School and planned this beautiful building, and that he was, perhaps, the principal factor in the construction of that magnificent General Hospital where the College of Medicine and Surgery has its clinics. All of these institutions are admired by visitors and constitute a perennial fountain of blessings upon the Filipino people.

But there is still another feature of his work which deserves notice. Paul Caspar Freer was a solicitous protector of the Filipino youth. It was his desire that young Filipinos should participate directly in the scientific movement which, since the establishment of American government, has been initiated here. For this reason, both government and private students, upon their return from abroad, found the Bureau of Science an adequate field for their studies and the Director, Doctor Freer, a generous adviser who knew how to encourage the spirit of personal initiative and original research.

Paul Caspar Freer also entertained the salutary idea of putting as many Filipinos as possible in his Bureau. On account of this policy, the division of mechanics of the Bureau of Science is at present completely entrusted to Filipinos; and, in the majority of the other divisions, the work of young Filipino graduates is by no means small. Two of them, Messrs. Timoteo Dar Juan and José del Rosario, in the division of chemistry, after graduating in pharmacy from private schools in this city, were asked by Doctor Freer to practise in his office. Later on, Doctor

Freer recommended their being sent to the United States as government students, and now they are instructors in the College of Medicine and Surgery.

This true friendship on Doctor Freer's part toward the Filipinos also manifested itself in the College of Medicine and Surgery, of which he was the Dean. It was a real source of pleasure for him to work with so many Filipino members of the faculty.

In rendering my humble tribute to the memory of that great friend of the Filipinos, allow me to suggest that we, his fellow-workers and admirers, especially his Filipino friends, place a votive tablet on one of the walls of this building, as a sincere token of our enduring appreciation of his disinterested service and as an outward expression of our unswerving admiration of his ideals as a man and a scholar.

PAUL C. FREER, CHEMIST.

By H. D. GIBBS,

Chief of the Division of Organic Chemistry, Bureau of Science, and Associate Professor of Chemistry, University of the Philippines.

In 1887 Paul C. Freer received the degree of doctor of philosophy in Munich. It is astonishing to note the number of great chemists who have received their first inspiration in chemical research in Professor Adolf von Baeyer's laboratory in Munich, and who have absorbed and later radiated the teachings of this great master. This period in v. Baeyer's work was largely devoted to the study of the structure of ring compounds and very soon afterward he published his classic series of articles on the structure of the benzene ring and the reduction of terephthalic acid.[1]

For some years before Doctor Freer received his degree, W. H. Perkin, jr., son of the Perkin who founded the industry of the manufacture of coal tar dyes, had been working in v. Baeyer's laboratory on the synthesis of ring compounds. In 1885 the first part of the article "On the Synthetical Formation of Closed Carbon-Chains" [2] was published. The continuation of this article [3] was published by the joint authorship of Freer and Perkin and was a further study of the construction of the ring compounds from open chains. Parts II and III were published by Perkin alone and in Parts IV and V Freer [4] again appears as

[1] *Ann. d. Chem.* (Liebig) (1888), 245, 103; (1889), 251, 257; (1890), 256, 1.

[2] *Journ. Chem. Soc. London* (1885) 47, 801, Part I. On some derivatives of trimethylene.

[3] The synthetical formation of closed carbon-chains, part I (continued). The action of ethylene bromide on the sodium-derivatives of ethylic acetoacetate, benzoyl-acetate and acetone-dicarboxylate, by P. C. Freer, Ph. D. and W. H. Perkin, jr., Ph. D., *ibid.* (1887), 51, 820.

[4] The synthetical formation of closed carbon-chains, part IV. Some derivatives of hexamethylene, by Paul C. Freer, Ph. D. and W. H. Perkin, jr., Ph. D., *ibid.* (1888), 53, 202; Part V. Experiments on the synthesis of heptamethylene derivatives, by Paul C. Freer, Ph. D. and W. H. Perkin, jr., Ph. D., *ibid.*, 215.

the senior author. The work commenced in v. Baeyer's laboratory was later carried on in the laboratory of Professor Dixon, Owens College, Manchester, England.

This research with Perkin is a valuable contribution to the knowledge of the tetra, penta, and hexamethylene rings and the derivatives of tetrone, pentone, and hexone. Efforts to synthesize the heptamethylene ring determined that the methods attempted were not feasible.

About this time Doctor Freer was offered a commercial position in the dye manufacturing industry and it became necessary for him to choose between this and an academic career. He chose the latter and, although knowing that the former meant greater financial reward, I know he never regretted his decision.

To my intimate knowledge there are two things which Doctor Freer carried through life as a result of his association in Munich. The first was his intense interest in the discussions of the structure and behavior of the benzene ring. Less than ten days before his death, we were at the Country Club in Baguio discussing some phases of the work described in an article which I had just presented to him for publication in the Philippine Journal of Science, when he enthusiastically said: "This throws more light on the benzene ring. We must further elucidate the structure of the benzene ring." The second was his generosity with his ideas and assistance to the younger chemists. Only we chemists of the Bureau of Science know how much of Doctor Freer's keen mind, inspiration, and editorial ability there is in the chemical articles originating in the Bureau, for his name seldom appears. We know that a person of less lofty ideals, less ability, and more self aggrandizement would have felt himself privileged, at least, to take the credit of a joint authorship in a large proportion of the published chemical research.

The next period of his research, extending from 1887 to 1902 during his residence in America, principally at Ann Arbor, Michigan, was largely concerned with the sodium derivatives of various ketones and aldehydes, their formation and behavior. In 1890 Doctor Freer contributed an important piece of research which did much to settle the mooted question of the constitution

of aceto-acetic ether, when he found that acetone, a substance containing no methylene group, was capable of forming a sodium derivative, the reactions of which were similar in nearly every respect to those of sodium aceto-acetic ether. This reaction proved to be a general one shown by other ketones as well as acetic aldehyde.

In 1898 he completed a most interesting piece of work on the constitution of phenylhydrazones. Some of the compounds prepared were very difficult to handle and were made in Michigan during the winter when the thermometer was about 20° below zero. The oxidation of acetone p-bromphenylhydrazone to p-brombenzene azo-isopropylene was especially troublesome, requiring careful handling even at this low temperature, and on several different occasions when our laboratories in the Bureau of Science were unusually warm, Doctor Freer brought up this subject with me and took delight in discussing the difficulties we would experience in trying to produce this reaction in Manila.

During this period, before his arrival in Manila, in addition to the 14 articles on ketones and aldehydes referred to, Doctor Freer also published papers on "The Saponification of Substituted Acetic Ester, Tetrinic Acid, The Constitution of Some Derivatives of Formic Acid, Distillation in Vacuum, Formamide, Jamaica Dogwood, Organic Peroxides, the Action of Acids on Metals, and Halogen Substitution Products of Aliphatic Acids," and two textbooks, one The Elements of Chemistry and the other Descriptive Inorganic General Chemistry. These books are very highly regarded both from a chemical and literary standpoint.

From 1901 to 1912, a period of a little over ten years spent in the Philippines, Doctor Freer found that, on account of his administrative duties in connection with the Bureau of Science and the Medical School, and his editorial work on the Philippine Journal of Science, his personal application to research was impossible, a fact which he regretted deeply. Nevertheless he found time to write a number of articles descriptive of the work of these institutions, and his address given at the commencement exercises of the Philippine Medical School, Feb-

ruary 27, 1909, and later published in the Philippine Journal of Science, is an inspiration to all workers in science. His editorial work was most conscientiously performed and I have known him to read many articles three times before the final appearance in print. During the last four years of his life, he developed the keenest interest in the studies of sunlight and sunlight reactions carried on in the Bureau of Science, and through his wide acquaintance and scientific reputation, he obtained the coöperation of various colleagues in America, Europe, Africa, Asia, Australia, and some of the most important islands outside of the Philippine Archipelago. This work was beginning to bear fruit at the time of his death, and he had already published two articles summarizing the results. It promises to throw much light upon several mooted questions concerning sunlight and its effects upon man, and in a few years would have resulted, I believe, in such an indisputable mass of valuable evidence that Doctor Freer and his friends would have regarded it as his crowning achievement.

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